

REMARKS

Claims 1-4, 6-7, 11, 15, 18, 20-23, 25, 30, 34, 36, 38, and 41 are cancelled.

Claims 5, 8-10, 12-14, 16-17, 19, 24, 26-29, 31-33, 35, 37, 39-40 and 42-45 are pending.

Claims 24, 26-29 and 31 are allowed.

Claims 5, 8-10, 12-14, 16-17, 19, 32-33, 35, 37, 39, 40 and 42-45 are rejected.

The final office action dated 1 July 2009 indicates that base claims 16, 32 and 44 are rejected under 35 USC §103(a). Base claim 16 is rejected as being unpatentable over Arnon U.S. Publication No. 2002/0114038 in view of Harres U.S. Patent No. 6,128,112 and Nakano U.S. Patent No. 6,795,675. Base claim 32 is rejected as being unpatentable over Arnon in view of Harres, Nakano, Saunders U.S. Patent No. 6,259,542 and Pulice U.S. Patent No. 5,270,533. Base claim 44 is rejected as being unpatentable over Arnon in view of Pulice.

Arnon discloses an optoelectronic transducer 80 including an avalanche photodiode (APD) 150, low noise preamplifier 152, detector 154, control 156 and power supply 158 (Figure 3). The APD 150 provides a current output that includes signal and noise portions (paragraph 238). The current output of the APD 150 is amplified by the amplifier 152, and a voltage level of the amplifier output is detected by the detector 154 (paragraph 238). The detected voltage level represents an average level that is a function of optical power level, background noise level and aggregate noise (paragraph 238). The control 156 uses the detected level to set a gain of the APD 150.

Arnon is silent about how the detected voltage is used to adjust the APD gain. Arnon is silent about computing or estimating noise energy. Arnon simply uses a detected voltage level representing both signal and noise portions.

Arnon doesn't "split" the amplified APD signal as page 4 of the office action alleges. The amplified current output contains both signal and noise portions. The

detected voltage level represents an average level that is a function of optical power level, background noise level and aggregate noise (paragraph 238).

Arnon doesn't "monitor noise level," as page 4 of the office action alleges. It uses a detected voltage level to set the gain of the APD. That detected voltage level represents an average level that is a function of optical power level, background noise level and aggregate noise (paragraph 238).

Arnon doesn't calculate noise level and use that noise level to control APD gain, as page 5 of the office action alleges. The gain is controlled in response to a detected voltage that represents optical power level, background noise level and aggregate noise (paragraph 238).

Harres discloses a noise energy estimation to determine a logic level in an optical signal. Harres computes a signal weighting factor that can be determined by the ratio of power of noise portion of a first phase segment to power of noise portion in a second phase segment in a signal (col. 3, lines 19-33). The signal weighting factor is used to determine the logic level of the signal (Figure 3, block 48; col. 3, lines 15-18; col. 6, lines 55-59; col. 10, lines 60-62; and col. 11, lines 8-17). Harres does not teach or suggest using the weighting factor to determine whether APD breakdown in a photodiode is imminent. Neither does Nakano.

Therefore, the combination of Arnon, Harres and Nakano does not teach or suggest a system having all of the features of claim 16. Moreover, the articulated reasoning for obviousness is not supported by Arnon and Harres. Prima facie obviousness not having been established, the '103 rejection of base claim 16 and its dependent claims should be withdrawn.

Nevertheless, base claim 16 has been amended. Page 2 of the office action indicates that adding certain features would make claim 32 allowable. It is fair to presume that adding those same features to claim 16 would make claim 16 allowable.

Those features are a “feedback loop for increasing dynamic range of the receiver when an optical signal is high”; “the threshold indicating that breakdown is imminent”; “comparing noise level with a threshold, the threshold value being at a point where a breakdown voltage of the receiver is eminent” and “adjusting at least one of an amplification of the optical signal and a gain of the receiver based on the noise level.” The features about a “feedback loop for increasing dynamic range of the receiver when an optical signal is high” and “the threshold indicating that breakdown of the photodiode is imminent” have been added. The features about comparing the noise level to a threshold, and adjusting amplification are already recited in claim 16. Therefore, amended base claim 16 and its dependent claims should be allowed for the reasons provided on page 2 of the office action.

Similar amendments have been made to base claim 32. Therefore, amended base claim 32 and its dependent claims should be allowed for the reasons provided on page 2 of the office action.

The ‘103 rejection of base claim 44 has been rendered moot by the amendments above. As discussed above, Arnon is silent about how APD gain is controlled, other than using a detected signal that represents signal and noise portions. Arnon does not teach or suggest “computing a ratio of noise energy for high and low optical signal states, and adjusting gain of the photodiode as a function of the ratio.”

The office action rejects claim 45, citing paragraphs 16, 110, 237-239, 250 and 291 of Arnon, and alleges that those paragraphs disclose the use of a ratio to control gain of an APD. However, those paragraphs do not support the allegation.

Moreover, the allegation is inconsistent with the rejection of base claim 16. In setting forth the rejection of claim 16, pages 4-5 of the office action acknowledge that Arnon does not disclose computing a ratio of average noise energies and reducing gain in response to the ratio (which is why it relies on Harres).

For these reasons, the office action does not establish prima facie obviousness of amended base claim 44. Therefore, the '103 rejection of base claim 44 and its dependent claims should be withdrawn.

A '112 rejection of claim 43 has been rendered moot by the amendment above to claim 43. Claim 32 provides antecedent basis for "the average energies."

A typographical error in claim 42 has been corrected. The examiner is thanked for pointing out that error.

The Examiner is encouraged to contact the undersigned to resolve any outstanding issues prior to mailing another office action.

Respectfully submitted,

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